

# **EXHIBIT 25**

**ATTORNEYS' EYES ONLY – SUBJECT TO SECOND AMENDED CONFIDENTIALITY  
ORDER (DKT. 608)**

**UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF ILLINOIS  
EASTERN DIVISION**

ANDREW CORZO, SIA HENRY, ALEXANDER LEO-GUERRA, MICHAEL MAERLENDER, BRANDON PIYEVSKY, BENJAMIN SHUMATE, BRITTANY TATIANA WEAVER, and CAMERON WILLIAMS individually and on behalf of all others similarly situated,

*Plaintiffs,*

v.

BROWN UNIVERSITY, CALIFORNIA INSTITUTE OF TECHNOLOGY, UNIVERSITY OF CHICAGO, THE TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK, CORNELL UNIVERSITY, TRUSTEES OF DARTMOUTH COLLEGE, DUKE UNIVERSITY, EMORY UNIVERSITY, GEORGETOWN UNIVERSITY, THE JOHNS HOPKINS UNIVERSITY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, NORTHWESTERN UNIVERSITY, UNIVERSITY OF NOTRE DAME DU LAC, THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA, WILLIAM MARSH RICE UNIVERSITY, VANDERBILT UNIVERSITY, and YALE UNIVERSITY,

*Defendants.*

Case No. 22-cv-00125

**SURREBUTTAL EXPERT REPORT OF LAUREN J.  
STIROH, PH.D.**

**November 1, 2024**

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have benefitted. Moreover, even if EFC calculations were closer together, the data Dr. Singer uses for this regression show that, on average, EFCs still differed by an average of \$14,476 when both Defendant schools were in the 568 Group.<sup>32</sup>

**B. Dr. Singer’s New “Harmed on Net” Analysis Reveals That His In-Sample Prediction Methodology Is Fatally Flawed**

15. Dr. Singer presents a new result using what he describes as a “harmed on net” methodology to purportedly demonstrate common impact.<sup>33</sup> This methodology is tied to Dr. Singer’s in-sample prediction analysis, in which he purports to be able to measure a specific overcharge for each individual proposed Class member – academic year observation.<sup>34</sup> In Dr. Singer’s “harmed on net” analysis, he sums these purported individual overcharges for each proposed Class member across all of their academic years in the Class Period to purportedly obtain a measure of “net harm” for each proposed Class member.<sup>35</sup> He claims that the results of this analysis demonstrate common impact and that his results are not mechanical, *i.e.*, are not the result of his model being mathematically rigged to deliver only one possible outcome.<sup>36</sup> However, Dr. Singer’s new analysis only demonstrates that his methodology is fundamentally incapable of assessing whether individual proposed Class members were harmed by the Challenged Conduct.
16. Dr. Singer’s new analysis does not address the fundamental flaw with his approach that I pointed out in the Stiroh Initial Report – that the statistical analysis employed by Dr. Singer imposes, rather than tests for, common impact.<sup>37</sup> His new methodology is inextricably linked to his flawed overcharge regression and thus suffers from the same flaws. For instance, as I demonstrate below, Dr. Singer’s methodology cannot identify unharmed proposed Class members. Dr. Singer’s new “harmed on net” analysis and the results he obtains from it confirm this.
17. That Dr. Singer imposes, rather than tests for, common impact is illustrated by the fact that his methodology mechanically returns a finding that *every* proposed Class member who only attended a Defendant school during the period when their school was a member of the 568 Group was “harmed on net” by exactly his generalized overcharge estimate of

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<sup>32</sup> For context, the average yearly real EFC for each Defendant during its Conduct Period ranges from \$23,637 at Yale to \$34,452 at Rice. Similarly, EIPs differed by \$17,939 on average when both Defendant schools were in the 568 Group. Hill turnover materials (Student school-pairs dataset); Singer reply turnover materials (EFC Regression Data); Singer Reply Report, Table 2.

<sup>33</sup> Singer Reply Report, ¶¶ 234-235.

<sup>34</sup> Expert Report of Hal J. Singer, Ph.D. (Errata II Updated), *Henry, et al. v. Brown University, et al.*, Case No. 1:22-cv-00125, United States District Court, Northern District of Illinois, Eastern Division, June 10, 2024 (“Singer Amended Report”), ¶ 255; Singer Reply Report, ¶¶ 224-225.

<sup>35</sup> Singer Reply Report, ¶ 234.

<sup>36</sup> Singer Reply Report, ¶ 235.

<sup>37</sup> Stiroh Initial Report, ¶ 164.

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\$1,202 multiplied by the number of years of data for the proposed Class member.<sup>38</sup> For example, there are 921 proposed Class members who attended Cornell from 2010 through 2013, all years in which Cornell was a member of the 568 Group.<sup>39</sup> Dr. Singer's methodology mechanically returns a finding that all 921 of these students were "harmed on net" by exactly \$1,202 (his generalized overcharge estimate) times four.<sup>40</sup> Thus, Dr. Singer's analysis of "harmed on net" is not a finding of class-wide harm but rather a mechanical outcome of his model.<sup>41</sup> All students are assigned an identical overcharge regardless of individual characteristics. This is wholly implausible given that actual total need-based aid varied for these students from \$8,615 to \$285,398.<sup>42</sup>

18. Almost 85 percent of all proposed Class member/school combinations have been assigned an identical overcharge of \$1,202 per year of attendance by Dr. Singer's methodology.<sup>43</sup> That is because that same 85 percent of the proposed Class member/school combinations only have observations at Defendant schools while those schools were in the 568 Group and no observations in Dr. Singer's benchmark periods.<sup>44</sup> This result is completely disconnected from the economics of the situation. For these 85 percent of student/school combinations to be injured by exactly the same amount, Defendants would have all had to make the same modifications to their needs analyses and packaging decisions, and these modifications, regardless of each student's idiosyncratic financial and personal circumstances, must have affected EFC calculations, aid packaging, and EIPs completely identically. As discussed in Sections IV and V of the Stiroh Initial Report, this is implausible.
19. As demonstrated in **Figure S3.4** below, for every single one of these proposed Class members that Dr. Singer says is "impacted," Dr. Singer's "harmed on net" methodology finds that the proposed Class member was overcharged on net by exactly \$1,202 times the number of years they appear in the data.<sup>45</sup> To the extent that any individual proposed Class members were not impacted by the Challenged Conduct, Dr. Singer's methodology is mathematically incapable of identifying them, as I detail below.

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<sup>38</sup> Such students do not have data observations that fall into the periods Dr. Singer defines as the benchmark periods for his overcharge analysis. While the results of Dr. Singer's analysis for such students clearly illustrate an issue with Dr. Singer's methodology, it remains that this methodology does not return meaningful results for proposed Class members with benchmark observations, either, for the reasons I explain in the Stiroh Initial Report. Singer Amended Report, ¶¶ 217, 281; Singer Reply Report, ¶¶ 57, 71, 211, 227, Table 6; Stiroh Initial Report, ¶¶ 197-202, Appendix 1.

<sup>39</sup> These are students who began at Cornell in 2010 and left in 2013 and have no other observations outside of those four years. Singer reply turnover materials (Singer Updated Regression Data).

<sup>40</sup> See Singer reply turnover materials (Singer Updated Regression Data).

<sup>41</sup> See **Figure 3.6**.

<sup>42</sup> Singer reply turnover materials (Singer Updated Regression Data).

<sup>43</sup> Singer reply turnover materials (Singer Updated Regression Data).

<sup>44</sup> Singer reply turnover materials (Singer Updated Regression Data).

<sup>45</sup> There are 35 proposed Class members for whom Dr. Singer predicts would have paid negative EIPs in the but-for world in at least one year. Dr. Singer drops these observations from his "harmed on net" analysis. Other than these 35 proposed Class members, every proposed Class member without benchmark observations is flagged by Dr. Singer as "impacted" according to both his "impacted at least once" criteria and his "harmed on net" criteria. Singer reply turnover materials (Singer Updated Regression Data).

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**Figure S3.4: “Net Overcharges” for Proposed Class Members Without Benchmark Observations According to Dr. Singer’s New “Harmed on Net” Methodology<sup>46</sup>**

| Years Attended School | Class Members | Class Members "Impacted" | Class Members "Impacted" by Exactly \$1,202 times Years Attended School |        |
|-----------------------|---------------|--------------------------|---|--------|
|                       |               |                          | (Count)   | (d)    |
| (a)                   | (b)           | (c)                      |   |        |
| 1                     | 45,030        | 45,030                   |   | 45,030 |
| 2                     | 24,568        | 24,561                   |   | 24,561 |
| 3                     | 27,486        | 27,468                   |   | 27,468 |
| 4                     | 71,136        | 71,126                   |   | 71,126 |

20. The fundamental shortcomings of Dr. Singer’s methodology for demonstrating common impact are also illustrated by his purported findings for proposed Class members at Dartmouth and Emory. Dartmouth and Emory only produced data that cover each student’s first academic year. For proposed Class members at Dartmouth and Emory with one observation in the data, Dr. Singer’s methodology “finds” that every single one of these proposed Class members was impacted by the Challenged Conduct and, moreover, that all were “harmed on net” by exactly the same amount as his generalized overcharge estimate.<sup>47</sup> Dr. Singer’s methodology is incapable of identifying any proposed Class members at Dartmouth and Emory who were not impacted by the Challenged Conduct.

**Figure S3.5: Results of Dr. Singer’s “Harmed on Net” Methodology for Proposed Class Members With One Observation at Dartmouth or Emory<sup>48</sup>**

| Defendant | Class Members | Class Members "Impacted" | Class Members "Impacted" by Exactly \$1,202 |     | Percent "Impacted" by Exactly \$1,202 |       |
|-----------|---------------|--------------------------|---|-----|---------------------------------------|-------|
|           |               |                          | (Count)                                     | (d) | (e)                                   | (f)   |
| (a)       | (b)           | (c)                      |   |     |                                       |       |
| Dartmouth | 7,724         | 7,724                    | 7,724                                       |     | 100 %                                 | 100 % |
| Emory     | 5,550         | 5,550                    | 5,550                                       |     | 100                                   | 100   |

21. In fact, the findings presented above are not surprising given that they are a mathematical result of Dr. Singer’s methodology and model. As I discussed in Appendix 1 of the Stiroh Initial Report, Dr. Singer’s purported “overcharge” for each observation is equal to the sum of the residual from his regression model and the generalized overcharge estimate.<sup>49</sup> Through the inclusion of student-school fixed effects and the mathematics of

<sup>46</sup> In this figure, “Years Attended School” refers to the number of years for which there are data for each proposed Class member/school combination. Singer reply turnover materials (Singer Updated Regression Data).

<sup>47</sup> There are two proposed Class members at Dartmouth and three proposed Class members at Emory who appear in multiple years in the data. Dr. Singer’s methodology flags all five as impacted and finds that all five were “harmed on net” by exactly \$2,404. See Singer reply turnover materials (Singer Updated Regression Data).

<sup>48</sup> Singer reply turnover materials (Singer Updated Regression Data).

<sup>49</sup> Stiroh Initial Report, Appendix 1.

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fixed effects in a linear regression, Dr. Singer's model imposes that the sum of residuals for each student's observations is equal to zero.<sup>50</sup> This has two implications.

- i. Every proposed Class member for whom there are only observations in the Conduct Period is mathematically guaranteed to have at least one observation flagged as "impacted" because for the residuals to sum to zero, at least one individual residual must be positive and at least one must be negative. Over 85 percent of proposed Class member/school combinations fall into this category.<sup>51</sup> By construction, if any of these proposed Class members were not impacted by the Challenged Conduct, Dr. Singer's model is mathematically incapable of identifying these proposed Class members.
- ii. For all of these proposed Class members, Dr. Singer purports to find that they are "harmed on net" by exactly his overcharge coefficient estimate times the number of years the proposed Class member appears in the data.

22. **Figure S3.6** presents an example from the data that demonstrates how Dr. Singer's model and methodology mathematically guarantees his conclusion (*i.e.*, it is mechanical). The figure presents findings from Dr. Singer's methodology for a student who attended Cornell from 2018 through 2021, all years in which Cornell was a member of the 568 Group. Column (d) presents the actual EIPs paid by the student in each year while column (f) presents Dr. Singer's predictions of what the student would have paid but for the Challenged Conduct. Column (g) presents the estimated residual for each observation from Dr. Singer's main regression specification, which is the difference between the actual EIP paid by the student and the fitted value that comes from Dr. Singer's full regression model, including his conduct coefficient.<sup>52</sup> Column (i) presents Dr. Singer's estimate of overcharge for each individual observation for this student, which is simply equal to the sum of the estimated residual from column (g) and his generalized overcharge estimate recorded in column (h).

23. In his "harmed on net" analysis, Dr. Singer sums the four values in column (i) to obtain a "net harm" estimate of \$4,808, which is equal to four times \$1,202. Because the observation-specific overcharge estimates in column (i) are themselves obtained by summing up the values from column (g) and column (h), the sum of the values from column (i) will be mathematically identical to the sum of all the values in columns (g) and (h). By construction, the estimated residuals in column (g) will sum to zero.<sup>53</sup> As such, Dr. Singer's methodology imposes that such a proposed Class member (*i.e.* one

<sup>50</sup> William H. Greene, *Econometric Analysis* (8th Edition) (New York: Pearson, 2018) ("Greene (2018)"), p. 33.

<sup>51</sup> Singer reply turnover materials (Singer Updated Regression Data).

<sup>52</sup> The fitted value for each observation from Dr. Singer's regression model can be expressed as the but-for EIP plus his generalized overcharge estimate. Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* (7th Edition) (Boston: Cengage, 2020), pp. 27-28.

<sup>53</sup> This is a consequence of the model Dr. Singer has chosen to employ in this context, which includes student and school fixed effects. Greene (2018), p. 33. Note that when applying Dr. Singer's "harmed on net" analysis to his EIP specification that uses only school fixed effects, rather than school and student fixed effects (*i.e.*, specification (3) instead of specification (6)), only 50 percent of proposed Class members are flagged as "harmed". Singer reply turnover materials (Singer Updated Regression Data); Singer Reply, Table 6.

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with observations in only the Conduct Period) is “impacted” and is “harmed on net” by precisely his generalized overcharge estimate times the number of years the proposed Class member appears in the data.<sup>54</sup> Because this framework is set up to guarantee only one outcome, it cannot establish common impact.

24. The wide range of overcharges for the same student across years in column (i) of **Figure S3.6** also illustrates that this methodology is flawed. According to Dr. Singer’s methodology, this student was purportedly harmed by more than \$4,000 in the 2019 academic year, benefitted from the alleged conspiracy by over \$9,000 in the 2020 academic year, and was harmed by almost \$9,000 in the 2021 academic year. And yet, under Dr. Singer’s model this student was still allegedly harmed in total by exactly the generalized overcharge estimate times the four years for which they were allegedly part of the proposed Class.

**Figure S3.6: Example of Outcomes from Dr. Singer’s Supposed In-Sample Prediction and “Harmed on Net” Methodology<sup>55</sup>**

| <b>UID</b>        | <b>School</b> | <b>Academic Year</b> | <b>Actual EIP</b> | <b>Fitted EIP</b> | <b>“But-For” EIP</b> | <b>Residual</b>  | <b>Generalized Overcharge Estimate</b> | <b>Observation-Specific Overcharge</b> |
|-------------------|---------------|----------------------|-------------------|-------------------|----------------------|------------------|--|--|
| (a)               | (b)           | (c)                  | (d)               | (e)               | (f)<br>(e) - (h)     | (g)<br>(d) - (e) | (h)                                    | (i)<br>(g) + (h)                       |
| UID_0000000004463 | Cornell       | 2018                 | \$ 14,130         | \$ 14,050         | \$ 12,848            | 80               | \$ 1,202                               | \$ 1,282                               |
| UID_0000000004463 | Cornell       | 2019                 | 19,531            | 16,703            | 15,501               | 2,828            | 1,202                                  | 4,030                                  |
| UID_0000000004463 | Cornell       | 2020                 | 7,739             | 18,428            | 17,226               | -10,689          | 1,202                                  | -9,487                                 |
| UID_0000000004463 | Cornell       | 2021                 | 25,322            | 17,541            | 16,339               | 7,781            | 1,202                                  | 8,983                                  |
| Total:            |               |                      |                   |                   |                      | 0                | <b>4,808</b>                           | <b>4,808</b>                           |

25. This is not a one-off example. While it is to be expected that positive and negative residuals would offset each other, it stands out that in some years, Dr. Singer’s estimated residuals are many times bigger than his estimated annual overcharge. For example, 26 percent of proposed Class members were overcharged by more than \$5,000 in at least one year and undercharged by more than \$5,000 in at least one other year, *i.e.*, both a single year overcharge and undercharge of more than the total amount by which any Class member is estimated to be injured if they attended a school for four years, all of which were during the Conduct Period.<sup>56</sup> The fact that Dr. Singer’s model shows such swings in overcharges year to year—with the same student supposedly being harmed by the conspiracy in one year by thousands of dollars only to benefit from it the next by thousands of dollars, with no apparent change to the nature of the conspiracy—shows the unreliability of his methodology.

<sup>54</sup> The “net harmed” amount for this student and all students that have four observations in the class period and none in the benchmark equals \$4,808, or \$1,202×4, as shown in **Figure S3.4**.

<sup>55</sup> Singer reply turnover materials (Singer Updated Regression Data).

<sup>56</sup> Singer reply turnover materials (Singer Updated Regression Data).

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EIP specifications.<sup>73</sup> These Defendant schools account for approximately 49 percent of Dr. Singer's Class observations.<sup>74</sup>

32. Similarly, Dr. Singer's model with institution and student fixed effects, after allowing the estimated effect of the Challenged Conduct to vary by Defendant school, does not demonstrate harm to Class members that attended Defendant schools Brown, Caltech, Columbia, Georgetown, Notre Dame, Penn, and Vanderbilt, in the specification that Dr. Singer uses for his damages calculation.<sup>75</sup> These Defendant schools account for approximately 47 percent of Dr. Singer's Class observations.<sup>76</sup> The numbers presented in **Figure S4.2** and **Figure S4.3** are similar to those in Figures 7.2 and 7.3 from the Stiroh Initial Report and any changes do not alter my overall opinions.

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<sup>73</sup> This is shown by a negative, or statistically insignificant, conduct coefficient in **Figure S4.2**.

<sup>74</sup> Class observation refers to the number of unique student, school and academic year observations in the revised data that were produced by Dr. Singer and purportedly used for his own analyses, without any modifications. *See* Singer reply turnover materials (Singer Updated Regression Data).

<sup>75</sup> This is shown by a negative, or a statistically insignificant, conduct coefficient in column (d) of **Figure S4.3**.

In addition to the Defendant schools listed above, Dr. Singer's student and institution fixed effects specifications do not demonstrate harm to proposed Class members that attended Johns Hopkins in at least one of Dr. Singer's other EIP and log EIP specifications.

<sup>76</sup> Class observation refers to the number of unique student, school and academic year observations in the revised data that were produced by Dr. Singer and purportedly used for his own analyses, without any modifications. *See* Singer reply turnover materials (Singer Updated Regression Data).

These Defendant schools account for approximately 48 percent of Dr. Singer's Class observations when Johns Hopkins is included.

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**Figure S4.2: School Specific Regression Conduct Coefficients, Including School Fixed Effects<sup>77</sup>**

| Defendant     | Level           |   |            | Log             |   |            |
|---------------|-----------------|---|------------|-----------------|---|------------|
|               | Base Regression | Base Regression and Institutional Level Control Variables |            | Base Regression | Base Regression and Institutional Level Control Variables |            |
|               |                 | (a)   | (b)        |                 | (c)   | (d)        |
| Brown         | -1,283 ***      | -193  | 448 **     | -0.017 ***      | -0.013 **   | -0.025 *** |
| Caltech       | 64              | 457   | -1,390 *   | -0.042 *        | -0.045 *  | -0.029     |
| Chicago       | 2,591 ***       | 2,056 ***   | 2,545 ***  | 0.024 ***       | 0.014 ***   | 0.098 ***  |
| Columbia      | -3,236 ***      | -5,935 ***  | -4,454 *** | -0.166 ***      | -0.126 ***  | -0.089 *** |
| Cornell       | 2,618 ***       | 3,093 ***   | 3,308 ***  | 0.163 ***       | 0.170 ***   | 0.110 ***  |
| Dartmouth     | -1,116 ***      | -1,532 ***  | -1,229 *** | -0.146 ***      | -0.133 ***  | -0.071 *** |
| Duke          | 4,960 ***       | 4,820 ***   | 5,093 ***  | 0.060 ***       | 0.078 ***   | 0.098 ***  |
| Emory         | 1,993 ***       | 2,988 ***   | 3,442 ***  | 0.083 ***       | 0.094 ***   | 0.052 ***  |
| Georgetown    | -5,773 ***      | -5,152 ***  | -5,075 *** | -0.166 ***      | -0.159 ***  | -0.229 *** |
| Johns Hopkins | -4,365 ***      | -5,415 ***  | -4,757 *** | -0.165 ***      | -0.159 ***  | -0.138 *** |
| MIT           | 5,486 ***       | 6,122 ***   | 6,144 ***  | 0.212 ***       | 0.186 ***   | 0.141 ***  |
| Northwestern  | 1,995 ***       | 1,708 ***   | 2,196 ***  | 0.009 **        | 0.037 ***   | 0.075 ***  |
| Notre Dame    | 2,453 ***       | 2,873 ***   | 3,175 ***  | -0.012          | -0.019  | -0.092 *** |
| Penn          | -1,524 ***      | -1,315 ***  | -424 ***   | -0.118 ***      | -0.127 ***  | -0.083 *** |
| Rice          | 1,731 ***       | 2,100 ***   | 1,771 ***  | 0.083 ***       | 0.098 ***   | 0.077 ***  |
| Vanderbilt    | -497 *          | -450 *  | -305       | 0.024 ***       | 0.004   | -0.039 *** |
| Yale          | 2,808 ***       | 2,791 ***   | 2,071 ***  | 0.069 ***       | 0.101 ***   | 0.053 ***  |

<sup>77</sup> Asterisks indicate statistical significance at different significance levels: \*\*\* <0.01 means statistical significance at the one percent level; \*\* <0.05 at the five percent level; and \* <0.10 at the 10 percent level. The dependent variables used are EIP and log EIP, respectively. See Singer reply turnover materials (Singer Updated Regression Data).

Columns (b) through (d) report the Defendant-specific conduct coefficients, using EIP specifications (1) through (3) of Dr. Singer's model, respectively (see Singer Reply Report, Table 6). Columns (e) through (g) report the Defendant-specific conduct coefficients, using log EIP specifications (1) through (3) of Dr. Singer's model, respectively. See Singer Amended Report, Appendix 4 Table 2.

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**Figure S4.3: School Specific Regression Conduct Coefficients, Including School and Student Fixed Effects<sup>78</sup>**

| Defendant     | Level           |   |   | Log             |   |   |
|---------------|-----------------|---|---|-----------------|---|---|
|               | Base Regression | Base Regression and Institutional Level Control Variables | Base Regression, Institutional Level, and Macroeconomic Control Variables | Base Regression | Base Regression and Institutional Level Control Variables | Base Regression, Institutional Level, and Macroeconomic Control Variables |
|               |                 | (a)   | (b)   | (c)             | (d)   | (e)   |
| Brown         | -386            | -119  | -8  | -0.026 ***      | -0.009  | -0.007  |
| Caltech       | 352             | 1,306   | -1,293  | 0.013           | 0.057 **  | -0.014  |
| Chicago       | 356 **          | 500 ***   | 634 ***   | 0.010 **        | 0.010 **  | 0.012 ***   |
| Columbia      | -204            | -266  | 40  | 0.007           | 0.003   | 0.004   |
| Cornell       | 4,380 ***       | 4,072 ***   | 3,834 ***   | 0.109 ***       | 0.102 ***   | 0.095 ***   |
| Dartmouth     | N/A             | N/A   | N/A   | N/A             | N/A   | N/A   |
| Duke          | 3,458 ***       | 3,878 ***   | 3,506 ***   | 0.070 ***       | 0.078 ***   | 0.068 ***   |
| Emory         | N/A             | N/A   | N/A   | N/A             | N/A   | N/A   |
| Georgetown    | -29             | -37   | -513  | -0.007          | -0.004  | -0.016  |
| Johns Hopkins | 1,099 ***       | -101  | 1,040 ***   | 0.043 ***       | 0.021 **  | 0.039 ***   |
| MIT           | 5,312 ***       | 4,642 ***   | 4,656 ***   | 0.165 ***       | 0.148 ***   | 0.147 ***   |
| Northwestern  | 1,411 ***       | 1,610 ***   | 1,839 ***   | 0.032 ***       | 0.027 ***   | 0.029 ***   |
| Notre Dame    | -1,062          | -1,626  | -1,272  | -0.023          | -0.047  | -0.034  |
| Penn          | -1,490 ***      | -290 *  | 24  | -0.054 ***      | -0.026 ***  | -0.016 ***  |
| Rice          | 1,605 ***       | 1,570 ***   | 1,380 ***   | 0.060 ***       | 0.060 ***   | 0.055 ***   |
| Vanderbilt    | 514 *           | 693 **  | -727 **   | 0.029 ***       | 0.036 ***   | -0.001  |
| Yale          | 2,467 ***       | 2,509 ***   | 2,320 ***   | 0.088 ***       | 0.080 ***   | 0.074 ***   |

33. **Figures S4.4** presents updated results of Figure 7.4 from the Stiroh Initial Report using Dr. Singer's revised data. A negative or statistically insignificant period-specific conduct coefficient shows that Dr. Singer's regression model does not estimate an increase in EIP during the Class Period for proposed Class members who attended Defendant schools within that specific time period.<sup>79</sup> In Dr. Singer's institution fixed effects specifications, 2008–2014 has a negative or insignificant conduct coefficient in all of Dr. Singer's EIP and log EIP specifications. These years account for 41 percent of Dr. Singer's Class observations.<sup>80</sup> In Dr. Singer's institution and student fixed effects specifications, the measured effect of the Challenged Conduct is negative or insignificant across all of his

<sup>78</sup> Asterisks indicate statistical significance at different significance levels: \*\*\* <0.01 means statistical significance at the one percent level; \*\* <0.05 at the five percent level; and \* <0.10 at the 10 percent level. The dependent variables used are EIP and log EIP, respectively. See Singer reply turnover materials (Singer Updated Regression Data).

Columns (b) through (d) report the Defendant-specific conduct coefficients, using EIP specifications (4) through (6) of Dr. Singer's model, respectively (see Singer Reply Report, Table 6). Columns (e) through (g) report the Defendant-specific conduct coefficients, using log EIP specifications (4) through (6) of Dr. Singer's model, respectively. See Singer Amended Report, Appendix 4 Table 2.

<sup>79</sup> Stiroh Initial Report, ¶ 180.

<sup>80</sup> Class observation refers to the number of unique student, school and academic year observations in the revised data that were produced by Dr. Singer and purportedly used for his own analyses, without any modifications. See Singer reply turnover materials (Singer Updated Regression Data).

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EIP and log EIP specifications for 2008–2014 and 2015–2019.<sup>81</sup> These years account for 68 percent of Dr. Singer's Class observations.<sup>82</sup>

**Figure S4.4: Regression Conduct Coefficients Using Dr. Singer's Model and Allowing the Conduct Coefficients to Vary Over Time<sup>83</sup>**

| Time Period   | Linear          |   |   | Log             |   |   |
|---|-----------------|---|---|-----------------|---|---|
|   | Base Regression | Base Regression and Institutional Level Control Variables | Base Regression, Institutional Level, and Macroeconomic Control Variables | Base Regression | Base Regression and Institutional Level Control Variables | Base Regression, Institutional Level, and Macroeconomic Control Variables |
|   |                 | (a)   | (b)   |                 | (c)   | (d)   |
| <b>Includes Institution Fixed Effects</b>             |                 |   |   |                 |   |   |
| 2003-2007   | 337 ***         | 379 ***   | 444 ***   | 0.030 ***       | 0.015 ***   | -0.015 ***  |
| 2008-2014   | -666 ***        | -574 ***  | -101  | -0.047 ***      | -0.044 ***  | -0.032 ***  |
| 2015-2019   | 1,840 ***       | 1,746 ***   | 2,289 ***   | -0.005 **       | 0.016 ***   | 0.048 ***   |
| 2020-2022   | 2,684 ***       | 2,700 ***   | 1,415 ***   | -0.013 ***      | 0.022 ***   | 0.030 ***   |
| <b>Includes Institution and Student Fixed Effects</b> |                 |   |   |                 |   |   |
| 2003-2007   | 1,675 ***       | 1,857 ***   | 1,931 ***   | 0.047 ***       | 0.045 ***   | 0.041 ***   |
| 2008-2014   | -1,037 ***      | -932 ***  | -780 ***  | -0.035 ***      | -0.026 ***  | -0.021 ***  |
| 2015-2019   | -1,592 ***      | -629 ***  | -114  | -0.041 ***      | -0.016 ***  | -0.001  |
| 2020-2022   | 2,967 ***       | 2,786 ***   | 2,071 ***   | 0.087 ***       | 0.082 ***   | 0.065 ***   |

34. **Figure S4.5** presents updated results from Figure 7.6 of the Stiroh Initial Report using Dr. Singer's revised data. Modifying Dr. Singer's benchmark classification to reflect the Complaint's allegation that the Challenged Conduct was in place through at least February 2023 (including for Defendants who formally left the 568 Group) yields a result where the conduct coefficient is negative in all of Dr. Singer's institution fixed effects EIP and log EIP specifications, and decreases in all of Dr. Singer's institution and student fixed effects EIP and log EIP specifications.<sup>84</sup> This result is similar to that of Figure 7.6 in the Stiroh Initial Report and any changes do not alter my overall opinion.

<sup>81</sup> The measured effect of the Challenged Conduct was also negative or insignificant across all of Dr. Singer's EIP and log EIP specifications with institution and student fixed effects for 2008–2014 and 2015–2019 prior to Dr. Singer updating his data, as shown in Figure 7.4 of the Stiroh Initial Report.

<sup>82</sup> Class observation refers to the number of unique student, school and academic year observations in the revised data that were produced by Dr. Singer and purportedly used for his own analyses, without any modifications. *See* Singer reply turnover materials (Singer Updated Regression Data).

<sup>83</sup> Asterisks indicate statistical significance at different significance levels: \*\*\* <0.01 means statistical significance at the one percent level; \*\* <0.05 at the five percent level; and \* <0.10 at the 10 percent level. The dependent variables used are EIP and log EIP, respectively. Years refer to academic years; for example, 2003 corresponds to academic year 2003–2004. *See* Singer reply turnover materials (Singer Updated Regression Data).

The figure reports the coefficients for each Conduct Period from my sensitivity analyses of Dr. Singer's regression model. The institution fixed effects rows in columns (b) – (d) (and (e) – (g)) relate to Dr. Singer's EIP (log EIP) specifications (1) – (3), respectively. The institution and student fixed effects rows in columns (b) – (d) (and (e) – (g)) relate to Dr. Singer's EIP (and log EIP) specifications (4) – (6), respectively. *See* Singer Reply Report, Table 6 and Appendix 4, Table 2.

<sup>84</sup> I use the same methodology to modify Dr. Singer's benchmark classification as I do in my initial report. *See* Stiroh Initial Report, footnote 413. In this specification, there are no available benchmark data for Brown, Cornell, Emory, Georgetown, MIT, Notre Dame, or Rice. Therefore, Dr. Singer's model, using the Complaint benchmark classification, does not estimate the impact of the Challenged Conduct at these Defendant schools.